Diabetes

FACT BOOK

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Division of Chronic Diseases
Diabetes and Arthritis Branch

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FOREWORD

The estimated prevalence of diabetes in the United States has
increasing during the past decade, and is expected to become eve
greater as our adult population over 40 increases. Almost half o
2.9 million people who have diabetes do not know it and consequen
have never been under a doctor's care for the disease.

These undetected diabetics are candidates for serious chronic
ability, blindness, and premature death unless they are found and
early enough to prevent such late consequences of the disease. D
is the third leading cause of blindness and ranks eighth among the
leading causes of death in the United States.

Though diabetes is not preventable, the late disabling effects c
minimized through early detection and treatment. Increased diab
casefinding especially among older persons, the obese, relatives
known diabetics, and parents of babies who weighed more than 9 p
at birth can make a strong impact upon the control of this serious
public health problem.

This fact book contains important data culled from various sou
which we believe will be valuable to physicians and other health w
in organized and voluntary health agencies interested in developin
diabetes casefinding programs or in expanding existing ones. It w
compiled by Quentin R. Remein, Assistant Chief, Technical Devel
Branch, and Lydia S. Shields, Public Health Analyst of the Divisio
Chronic Diseases.

Glen W. McDonald, M. D.
Chief, Diabetes and Arthritis Pro

Table 1

Estimated prevalence of known and unsuspected diabetes and rate per 1,000 population by age, United States, 1959

	Known cases[1]	Unsuspected cases[2]
	Estimated number of cases (in thousands)	
s	1,530	1,400
25	67	51
	199	240
	246	360
	424	366
	416	258
over	177	126
	Rate per 1,000 population	
s	9.0	8.1
25	0.9	0.7
	4.4	5.2
	12.4	17.9
	28.4	24.2
	42.9	26.2
over	35.6	24.5

onal Health Survey: Diabetes reported in interviews, United States, July 1957-June 1959; Public Health Service Pul Washington, U.S. Government Printing Office, 1960.

cases defined as diabetes unsuspected by the patient or physician. Estimate prepared on basis of studies and surveys Arthritis Branch, Division of Chronic Diseases.

WN CASES OF DIABETES

proximately 1.4 million of the persons who have diabetes are not aware of thei s have never been under a doctor's supervision for diabetes. Epidemiologic st s indicate that these persons are: older, more obese, more frequently relative somewhat more likely to be women, and more likely to be parents of large bab eral population. These persons constitute 8.1 persons per 1,000 of our populat ent our national diabetes casefinding problem.

KNOWN CASES OF DIABETES

Diabetics who have at some time been diagnosed by a physician currentl million persons or 9.0 persons per 1,000 population. Independent estimates Division of Chronic Diseases based on epidemiologic community studies and tional Health Survey based on household interviews of a random national sam agreement. The estimates are 1.5 million and 1.53 million cases respective

Prevalence of diabetes increases with age reaching a peak at ages 65-74 slightly thereafter. As shown in table 1, there is more known diabetes than among persons under 25 years of age and among persons 55 years and older, adult years (25-54 years of age), however, the proportion is reversed -- ther more unknown cases in the population than known cases. No objective evider account for this, but a logical explanation is that the juvenile type of diabetes teristically acute and thus likely to be discovered; and in the older age group have begun to develop and clinical symptoms appear in previously asymptom the young adult and middle years, the onset of diabetes is very likely to be a is significant that the proportion of persons with diabetes remaining undisco untreated is large at all ages.

Table 2 shows the prevalence of known diabetes by age and sex. The pr diabetes is greater for males under age 45, but in every age group thereafte among females. Little is known of the relative prevalence among men and w rently undiagnosed group of diabetics. There is some evidence that the diffe and female rates of previously unknown diabetes in casefinding programs is among the known cases. Perhaps this is because men do not seek medical c frequency as women.

Table 2

Average prevalence of known diabetes and rate per 1,000 popu by age and sex, United States, July 1957-June 1959

Age	Average number (in thousands) Male
All ages	660
Under 25	40
25-44	106
45-54	108
55-64	181
65-74	156
75 and over	68
	Rate per 1,000 population
All ages	8.0
Under 25	1.1
25-44	4.9
45-54	11.2
55-64	25.2
65-74	34.4
75 and over	31.5

Source: U.S. National Health Survey. Diabetes reported in Interviews, United States, July 1957-June 19 Service Publication No. 584-B21. Washington, U. S. Government Printing Office, 1960.

Table 3 shows the prevalence of known diabetes by age and residence for the c
on. Diabetes is a problem of smaller communities and rural areas as well as
possibly even a slightly greater one in the small urban and rural areas.

Table 3

Prevalence of known diabetes among persons 45 years of age and over by age and residence, United States, July 1957-June 1959

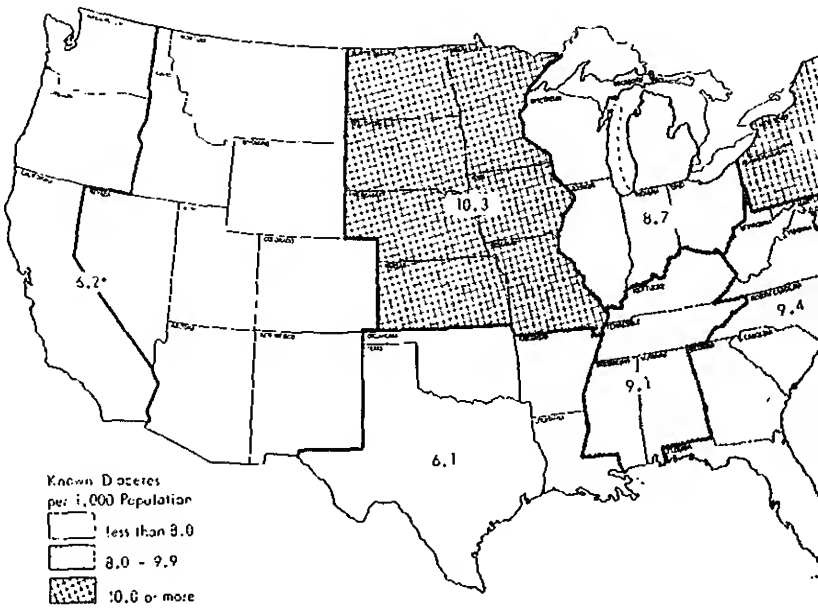
	Urban	Rural nonfarm	Ru
	Number of cases (in thousands)		
ages 45 and over	802	297	
54	157	54	
64	268	99	
74	264	103	
nd over	112	41	
	Rate per 1,000 population		
ages 45 and over	24.8	26.9	
54	12.1	12.0	
64	27.0	31.2	
74	41.7	47.8	
nd over	35.8	34.4	
-adjusted s, ages 45 and over	24.8	27.1	

e: U.S. National Health Survey. Older persons, selected health characteristics, United States, July 1957-June 1959 Service Publication No. 584-C4. Washington, U.S. Government Printing Office, 1960.

Geographic variations in crude prevalence rates of known diabetes as reported rviews in the National Health Survey are shown in figure 1. The highest rates England, Middle Atlantic, and West North Central States. In general, the rate n eastern to southern and western regions. The rate for the highest region, the ntic States, was almost double that of the lowest, the West South Central States ates was much more marked than that for any other chronic condition cited in t ort.

Figure 1

PREVALENCE OF KNOWN DIABETES, BY GEOGRAPHIC DIVISION
Rates per 1,000 Population
July 1957 - June 1959



* Figure shown in each region is known diabetes rate for that region except that the Mountain States a combined with the Pacific States because the magnitude of the sampling error precludes showing a se estimate for the Mountain States.

Source U.S. National Health Survey: Selected Health Characteristics by Area, Geographic Divisions, and U.S. July 1957 - June 1959. PHS Pub. No. 584-C6, 1961.

DISABILITY FROM DIABETES

Uncomplicated diabetes under reasonable control causes little or no difficulty tic and results in little work loss except for physician visits. With the complica tes in later life there is considerable disability. Measurement of this disability cause the nature of some of the complications is such that it may not be ascribe t rather to the complicating disease. How much this factor affects the reported om diabetes is not known.

Table 4, adapted from National Health Survey data obtained by household inter noninstitutional population, shows chronic limitation of activity as described by the e to diabetes. Limitation of activity includes complete limitation of activity and pe or amount of the person's activity even though he may be able to carry on his ity. About 25 percent of all disbetics have chronic activity limitation -- more in an in males. In both sexes the percentage of persons with limitation rises with a pears to be a tendency toward a small peak in the rates in ages 25-44 which is v e to juvenile diabetes of some duration in these age groups. This may be contri nsiderable amount of disability at an age when the prevalence of diabetes is low.

In the fiscal year 1959, the National Health Survey[1] reported that diabetics wi ee of activity limitation constituted 2.1 percent of all persons with a chronic con rted as causing limitation. For the more serious limitation where the person is rry on his major activity 3.1 percent were disabled by diabetes. In the group wi rious limitation in amount or kind of activity, diabetes accounted for 1.9 percent

Table 4

Known diabetics whose diabetes caused chronic limitation of activity, by age and sex, U.S. civilian noninstitutional population, July 1957 - June 1959

	Male	Female
	Number (in thousands)	
l Ages	138	247
der 25	4	4
-44	21	27
-54	18	37
-64	34	54
-74	38	82
and over	21	44
	Percent of all diabetics	
. Ages	20.9	28.4
der 25	10.0	14.8
-44	19.8	29.0
-54	16.8	26.6
-64	18.8	22.1
-74	24.4	31.5
and over	30.9	40.4

rce- Adapted from U. S. National Health Survey: Diabetes reported in interviews, United States, July 1957-June 195 Service Publication No. 584-B21, Washington, U. S. Government Printing Office, 1960.

Rates of disability per diabetic are shown in table 5 in terms of restricted-activit
ed-disability days. A day of restricted activity is defined by the National Health
ny day on which a person had to cut down on his usual activities for a whole day
s condition whether or not he was confined to bed," and a bed-disability day is def
on which more than half the daylight hours were spent in bed because of a specif
ss. . ."

Diabetes was responsible for about 30 million restricted-activity days per year o
illion were bed-disability days. This averages about 20 restricted-activity days
for each year of which 8.5 days per diabetic were bed-disability days. Both rest
ity and bed disability are highest in the diabetic females 65 years of age and over

Table 5

Average number of disability days associated with diabetes
by age and sex
U.S. civilian noninstitutional population, July 1957 - June 1959

Age	Male	Female
	Restricted-activity days per diabetic per year	
ages	17.0	22.0
er 45	6.3	18.7
64	22.5	22.4
64	21.4	17.5
74	17.2	23.9
nd over	19.5	30.2
	Bed-disability days per diabetic per year	
ages	6.6	9.9
er 45	2.1	3.9
64	8.5	8.9
64	8.2	6.2
74	5.5	14.0
nd over	11.5	16.3

e: U.S. National Health Survey: Diabetes reported in interviews, United States, July 1957-June 1959; Public Health Se
Publication No. 584-B2, Washington, U.S. Government Printing Office, 1960.

According to the National Health Survey[1] "the majority of the diabetics, sick or w
members of the usually working population either because of age, retirement stat
ause they are females keeping house." Among diabetic workers in industry the pr
enteeism is small, according to the special study by Pell and D'Alonzo (table 6).[2]
blem of absenteeism of diabetics appears to be concentrated among only about 4 p
diabetics with three or more absences in a year. The average number of days of
diabetics was, however, almost twice that for the nondiabetic control group. The
ability days among the diabetics was caused by other illnesses as well as by diabe

Table 6

Study of sickness absenteeism in industry
Number of sickness absences during 1956 and average number of disability d
among diabetics and nondiabetic controls

umber of ess absences	Diabetics Number	Percent	Nondiabetic Number
	240	61.7	259
	96	24.7	92
	37	9.5	18
	14	3.6	7
	2	.5	3
or more	0	0.	3
number of cases	389	100.0	382
ility days			
Total number	4,200		2,150
Average	10.8		

DNESS DUE TO DIABETES

Eye complications leading to blindness are significant among the sequelae of dia
there were an estimated 28,400 persons in the United States who were blind be
es. As shown in table 7, diabetic blindness is the third leading cause of blindn
ituted 8.4 percent of all blind persons. It is estimated that 11.6 percent of the
d blindness in 1957 occurred as a result of diabetes. National estimates of inci
iod of time are not available to determine whether the absolute rate of diabetic
reasing. *Scattered data from States indicate, however, that this may be so.*

Table 7

Ten leading identified causes of blindness
in the United States, 1957

s of blindness	Rate per 100,000 population	Per all
All Causes*	197.0	
cataract	35.0	
oma	26.7	
ETES	16.6	
lar disease	12.8	
na	9.8	
lity	8.9	
is	7.5	
lental fibroplasia	4.7	
asms	2.5	
almia neonatorum	1.1	

s blindness due to cause undetermined or not specified.

COMPLICATIONS OF JUVENILE DIABETES

The major complications developing in juvenile diabetics include coma, and vascular damage. Vascular damage is by far the most important comp disability and mortality. Table 8 shows the incidence of vascular lesions i juvenile diabetics followed for more than 20 years in the Joslin Clinic (Bos ...r lesions rarely occurred under the age of 20, but became prevalent by a had retinopathy, 40 percent had calcified arteries, and 40 percent had hype ...sion; 9 percent developed uremia; 6 percent, blindness; and 6 percent, in

By 35 years of duration of diabetes nearly all patients in the series sh 95 percent had calcified arteries and 93 percent, retinopathy. Most of the ... to appear in significant proportions until the 10th to the 15th year of the kn disease.

Table 8

Incidence of vascular lesions, by age and duration of diabetes i juvenile diabetics surviving more than 20 years*

	Albumin	Blood pressure	Retinitis	Retinitis proliferan
Age	Percent of patients by age			
0-9	0	0	0	0
10-19	4.2	1.8	4.8	0
20-29	18.5	16.7	63.2	28.7
30-39	34.7	40.3	84.4	53.1
40-49	37.6	51.9	88.0	58.4
Duration	Percent by years duration of diabetes			
0-4	.8	.5	0	0
5-9	1.5	1.2	2.5	0
10-14	7.0	4.5	19.0	3
15-19	18.0	15.0	59.0	18
20-24	41.0	32.0	82.0	47
25-29	39.0	44.0	88.0	46
30-34	44.0	53.0	93.0	59
35-39	63.0	70.0		

*These comprise 28.7 percent of the 1,752 juvenile cases treated at the Joslin Clinic up to Aug. 1, 1955.

Source: White, Priscilla. Natural course and prognosis of juvenile diabetes. Diabetes 5 445-450, Nov.-Dec. 1

DIABETES MORTALITY AND LIFE EXPECTANCY

In 1958, diabetes mellitus caused the death of 27,501 persons (15.9 per 100,000 p
king eighth as a cause of death in the continental United States (table 9). In additi
sons classified as dying from diabetes, a large number of persons with diabetes d
:ular degeneration and are classified in one or another of the categories of cardi
al conditions. Studies differ on the proportion of such deaths basically caused by

Table 10 shows the diabetes mortality rates by age, race, and sex. In all race-s
death rate increases rapidly with age. The highest death rate was among the non
ales (21.1 per 100,000) followed by white females (18.5) and white males (13.1); t
white males (11.1) was only about half of the rate for nonwhite females. Among w
sons the male and female rates were alike until age 25. In the ages 25 through 5
was slightly higher, and after age 55, the female rate was much higher. For no
sons the female rate was higher in all ages except in the oldest. These patterns
resting materials for epidemiologic study and are the subject of much theorizing
on. The sex-age pattern for prevalence is similar to the mortality pattern so tha
art the higher mortality in females is accounted for by a higher diabetes prevale

Table 9

Ten leading causes of death
Death rates per 100,000 population,
United States, 1960

se of death	
All causes	
Diseases of heart	
Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues	
Vascular lesions affecting central nervous system	
Accidents	
Certain diseases of early infancy	
Influenza and pneumonia, except pneumonia of newborn	
General arteriosclerosis	
DIABETES MELLITUS	
Congenital malformations	
Cirrhosis of liver	

e: U.S. National Office of Vital Statistics. Vital Statistics – Special Reports, Vol. 52, No. 7.

Table 10

Deaths and death rates for diabetes by age, race, and sex, Continental United States, 1958

Age	Total	White			Both sexes
		Both sexes	Male	Female	
	Number of deaths				
All Ages	27,501	24,378	9,920	14,458	3,123
Under 15	177	143	67	76	34
15 - 24	203	158	77	81	45
25 - 34	575	475	285	190	100
35 - 44	977	761	458	303	216
45 - 54	2,230	1,683	867	816	547
55 - 64	5,598	4,719	1,969	2,750	879
65 - 74	9,666	8,802	3,322	5,480	864
75 - 84	6,610	6,256	2,352	3,904	354
85 and over	1,461	1,378	522	856	83
Unknown	4	3	1	2	1
	Death rates per 100,000 population				
All Ages	15.9	15.8	13.1	18.5	16.2
Under 15	.3	.3	.3	.3	.5
15 - 24	.9	.8	.8	.8	1.6
25 - 34	2.5	2.3	2.8	1.8	3.9
35 - 44	4.2	3.6	4.4	2.8	9.2
45 - 54	11.1	9.3	9.7	8.8	28.2
55 - 64	37.0	34.0	29.4	38.3	69.7
65 - 74	97.9	95.4	77.1	111.4	134.0
75 - 84	152.6	154.9	134.3	170.6	120.8
85 and over	173.3	182.3	166.2	193.7	96.5

Source. Vital Statistics – Special Reports, Vol. 52, No. 4.
Current Population Reports, Series P-25, No. 212.

Mortality and expectation of life among diabetics and the general population
table 11. It is evident that the mortality among diabetics is higher at every age.
for diabetes were from 5 to 10 times the rates in the general population among c
young adults and at least double in later life.

The expectation of life is less among diabetics at all ages than the general p
diabetic child can look forward to about 17 years of life less than his counterpar
population. Even at age 60 with a life expectancy of about 11 years the diabetic
ward to 6 years less than his counterpart in the general popalation.

The information on diabetics is based on the experience of the Joslin Clinic
the Metropolitan Life Insurance Company.

Estimates of the potential years of life lost were made for the diabetics dyi
1950 and 1957. In the latter year, as shown in table 12, almost 400,000 man yea
lost because of premature death from diabetes. Years of life lost through death
have increased by over 8 percent in the short 7-year interval covered by the dat

Table 11

Expectation of life and mortality rate at selected ages among diabetics and among white persons in the general population

Experience in 1947-51 for diabetic patients of Joslin Clinic first obse
in 1930-51 and for general population of United States in 1949-51

Attained age	Expectation of life, in years		Mortality rate	
	Diabetics*	General population	Diabetics*	Gen
10	44.3	61.5	2.6	
15	40.0	56.7	4.6	
20	36.1	51.9	8.0	
25	32.8	47.2	13.1	
30	30.1	42.5	15.2	
35	27.2	37.9	12.6	
40	23.7	33.3	12.2	
45	20.2	28.9	16.1	
50	16.9	24.7	21.6	
55	13.8	20.8	32.2	
60	11.3	17.2	49.8	
65	9.2	13.9	64.9	
70	7.2	10.9	86.3	

*Excludes deaths within 1 week of first observation or hospital discharge.
Note: Analysis of Joslin Clinic experience by Metropolitan Life Insurance Company.

Source: Stat. Bull. (Metropolitan Life Insurance Company) 38: 2, March 1957.

Table 12

Deaths from diabetes and estimated potential years of life through deaths from diabetes, United States, by race and sex,

Race and sex	Diabetes deaths			Estimated l lost*
	Number in 1950	Number in 1957	Percent change	1950
Total	24,419	27,180	11.3	365,843
White male	8,580	9,623	12.2	118,885
White female	13,567	14,611	7.7	202,417
Nonwhite male	768	982	27.9	13,600
Nonwhite female	1,504	1,964	30.6	30,941

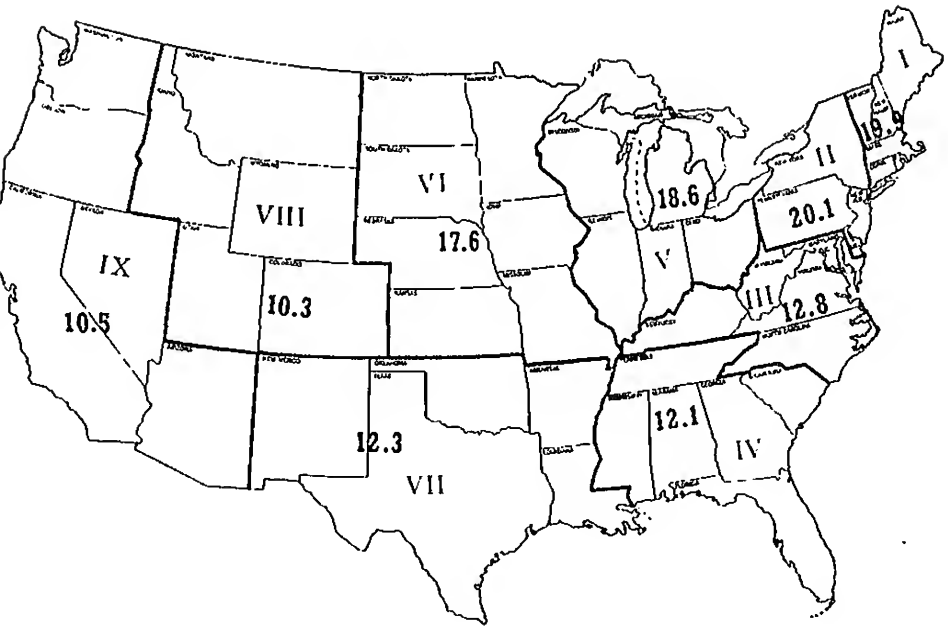
*Based on life expectancy tables not eliminating diabetes as a cause of death.

Source: 1950 data from Grant, A.P. and Kurlander, A.B. Diabetes mortality in the Continental United St 363-369, April 1955.

1957 data from U.S. National Office of Vital Statistics. Vital Statistics - Special Reports, Mortalit race, and sex. United States, 1957, (Vol. 50, No. 5); and Abridged Life Tables, United States, 195

The crude diabetes death rates by Regions of the Department of Healt Welfare (HEW) are shown in figure 2 and by States in figure 3. The highes rates were in the Northeast and North Central States, and the Southwest a lowest rates. By HEW Regions, Regions II, I, V, and VI had highest rates,

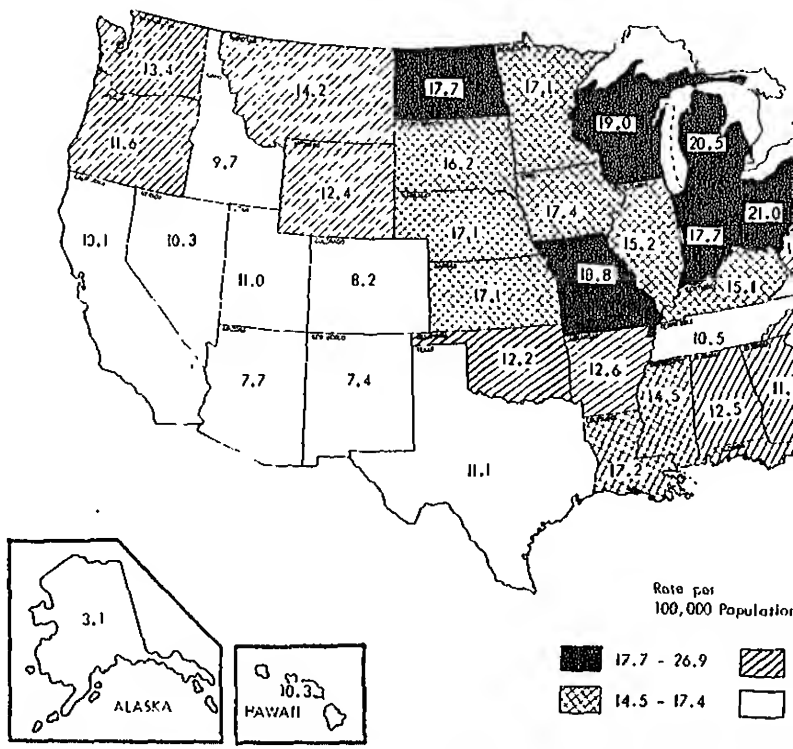
CRUDE DIABETES DEATH RATES, BY DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE REGIONS
Per 100,000 Population, 1958



U.S. National Office of Vital Statistics - Special Reports, Vol. 52, No. 2
U.S. Bureau of the Census Current Population Report Series P-25, No. 208

Figure 3

DIABETES DEATH RATES, UNITED STATES, 1958



The trend in diabetes death rates in the United States since 1900 is shown in figur
narized in table 13. Up to 1940, the long-term trend was steadily upward even wh
ent was made for the changing age composition of the population over the time pe
een 1940 and 1950 the crude rate leveled off while the age-adjusted rate showed a
ne. During this period a break in continuity resulted from changes in definitions
ons of cause of death. Definition of deaths classifiable as due to diabetes was gr
ed resulting in a 43-percent reduction in deaths solely due to classification chang
deaths reclassified under the new definition went into cardiovascular-renal dise
the revised classification system, the diabetes death rates since 1949 have decli
ly.

Figure 4

DIABETES DEATH RATES PER 100,000 POPULATION 1900 - 1958

Expanding Mortality Registration Area

Table 13

Diabetes death rates per 100,000 population
crude and age-adjusted
Continental United States, expanding death registration area
1900-1958

Year	Crude rate		Age-adjusted rate[a]	
1900	11.0		13.0	
10	15.3		18.9	
20	16.1		19.8	
30	19.1		22.2	
40	26.6		26.6	
48	26.4		24.3	
50[b]	28.4	16.2[b]	24.5	14.3[b]
51		16.3		14.2
52		16.4		14.2
53		16.3		14.0
54		15.6		13.3
55		15.5		13.2
56		15.7		13.3
57		16.0		13.5
58		15.9		13.4

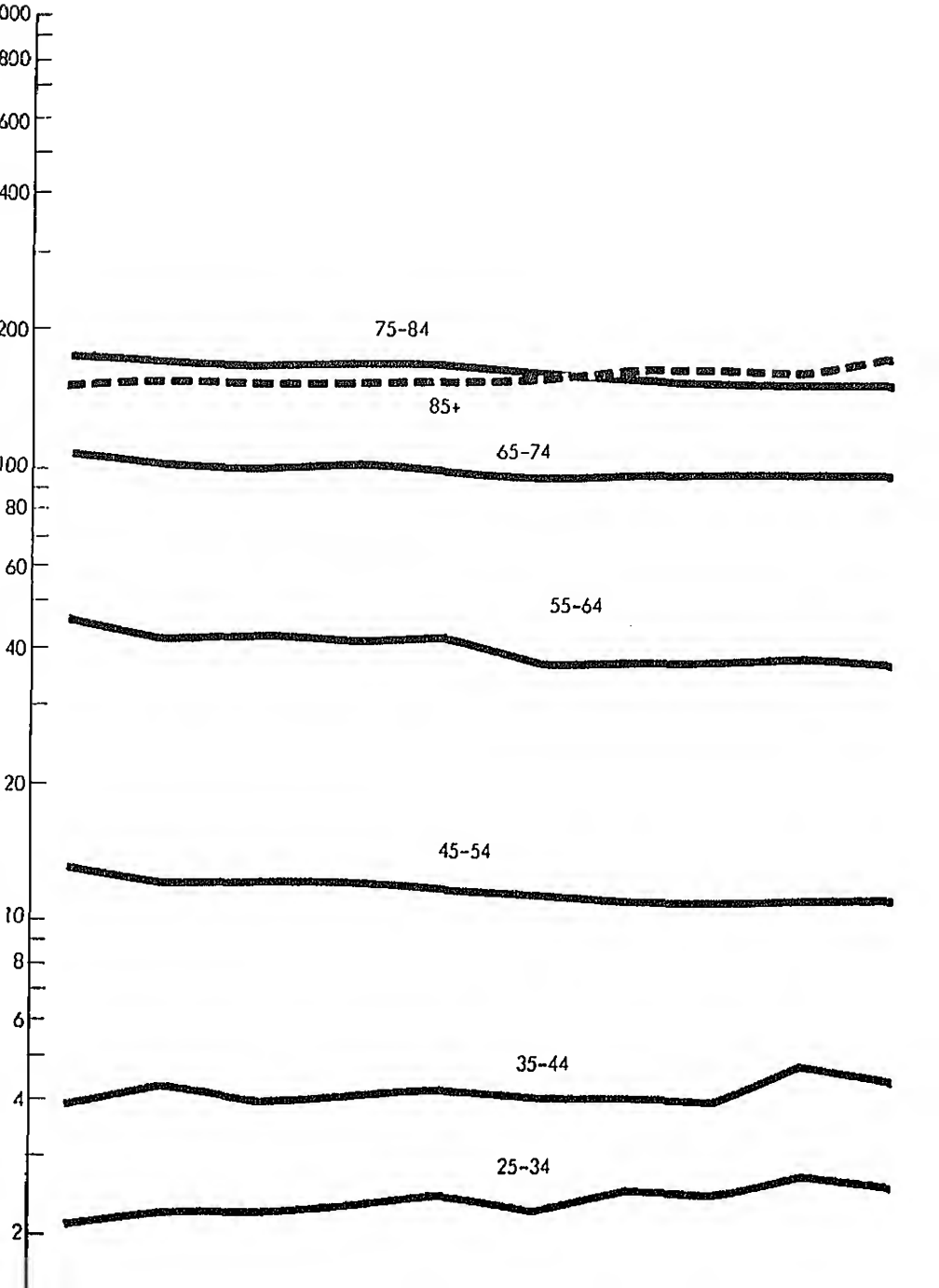
[a] All rates adjusted to age distribution of the population in 1940.
[b] Coded according to the 5th and 6th Revisions of the International Lists of Diseases and Causes of Death. Subsequent data are classified according to the 6th Revision (7th Revision for 1958 data).

Source U. S. National Office of Vital Statistics.
Vital Statistics-Special Reports, Vol. 43, No. 12, and National Summaries each year, and unpublished data.

The recent trends in diabetes mortality by age are shown in figure 5. Very slight
elatively stable rates are noted for the younger age groups. Slight decreases are
dle age and increases noted in the very old. In diabetes among adults there seems
ht increase in life expectancy compensated for by a small increase in mortality in

Figure 5

DEATH RATES FROM DIABETES MELLITUS, CONTINENTAL UNITED STATES, 1949-58



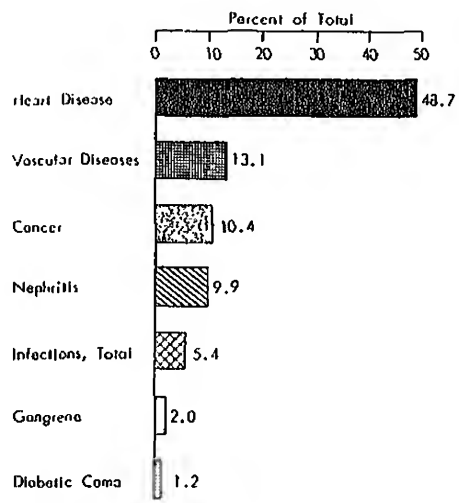
ELECTED CAUSES OF DEATH IN TWO STUDIES OF DIABETIC PATIENTS

Not all deaths of diabetics are classified as being due to diabetes. Figure 6 pre
ortional mortality for selected causes of death among diabetes patients in a large c
oslin Clinic, Boston, Mass.) and in a community epidemiologic study (Oxford, Mas
th study groups, deaths classified as due to diabetes are only a small fraction of th
aths. Deaths from cardiovascular-renal causes are about 72 percent of the total J
linic group and 65 percent of the Oxford group. Cardiovascular-renal causes acco
out 58 percent of the deaths in Massachusetts in 1958. Renal diseases account for
out 1 percent of deaths in the Massachusetts population but amount to 10 percent a
nt, respectively, in the Joslin and Oxford groups. Deaths from cancer comprised
the total in the two study groups, but accounted for 17 percent of deaths in the gen
pulation.

Figure 6

SELECTED CAUSES OF DEATH AMONG DIABETIC PATIENTS IN TWO STUDIES

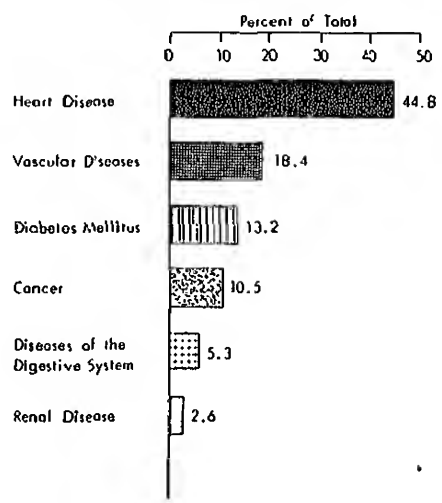
Experience of Joslin Clinic, Boston, Mass., 1950-56*



*Deaths reported through September 11, 1956

Source: Stat. Bull. 30:3, March 1957

Experience in a Community Epidemiologic Study
Oxford, Massachusetts, 1947-1957**



**Source: Wilkerson, H.L.C., Kroll, L.P., and Butler, F.K.: Diabetes in a New England Town. IV-A 12 - year progress report on the 70 diabetics found in the original Oxford, Mass. study. To be published.

EPIDEMIOLOGIC FACTORS IN DIABETES

Over the many years of careful study of diabetes in population groups, certain po
ocial factors appear to be associated with the occurrence or presence of diabete
eaning of some of these associations and their causes will probably continue to
ny, knowledge of these factors has aided in the early recognition of diabetes. F
groups within the population may be approached more directly, making possible
in diabetes screening. These epidemiologic factors include age, sex, obesity,
y of diabetes, birth of a large baby or babies, high rates of fetal wastage, and a
ther diseases.

s shown in the sections on Incidence and Prevalence, age is an important varia
. Two-thirds of the estimated known diabetics are 55 years of age or older. Fe
mber males in every age group over 45, very noticeably at ages 65-74. (See tab

Diabetes prevalence is higher among the obese as measured by 20 percent or mo
able weight. Table 14 illustrates this relationship with data from two studies:
area and one, urban. In both instances, the percentage considered obese is hig
abetics and those suspicious of diabetes. This was true of both males and fema

Table 14

Percentage of persons overweight, by diabetes status

Two screening programs

	Both sexes		Male		Fema	
area	Number	Percent overweight[a]	Number	Percent overweight[a]	Number	ov
tested	3,703	26	1,145	22	2,558	
eened positive	178	46	75	36	103	
betes previously known	51	51	17	46	34	
betes previously own	51	45	27	33	24	
n area						
tested	6,746	36	2,095	30	4,651	
betes previously known	293	55	104	38	189	
ential diabetes	68	48	32	41	36	

eight defined as 20 percent or more above desirable weight according to standard height-weight tables.

Meyer, W. J.: Continuous screening in a rural area. Pub. Health Rep. 75: 784-790, Sept. 1960.

Unpublished data from Brownsville Diabetes Control Center, New York City, 1955.

s been recognized for centuries that diabetes "runs in families." Predisposit
is probably inherited through a complex of factors. Environmental factors su
atterns and health and other habits undoubtedly also play a role in familial dia
shows the rates of diabetes among relatives in a screening program conducte
n 1958 and 1959. The age-adjusted rate of diabetes in this group is about 2 1/
nal prevalence rate. The difference should be considered minimal inasmuch a
gnosis in this group was not complete and screening tests are only about 75 pe
, indicating that some cases among these relatives undoubtedly were missed.
e cases in the Florida study were unknown previously. Whether this relations
most places in this country is not known.

ies of the degree of the relationship most closely associated with diabetes sho
ong parents, next siblings, then children, and finally, other relatives. Of cour
important factor in this apparent relationship.

Table 15

Screening for diabetes among relatives of diabetics in Florida 1958-1959

Comparison with national prevalence rate by age, rates per 1,000 persons

	Relatives of diabetics in Florida			National prev rate per 1,
	Number of relatives tested	Diabetes rate per 1,000		
		Total	Previously unknown	Total
	322	9.3	3.1	1.6
	291	30.9	17.2	9.6
	154	51.9	39.0	30.3
	76	118.4	39.5	52.6
	44	136.4	45.5	69.1
ver	13	153.8	153.8	60.1
sted rate*	-	41.0	21.1	17.1

tes among the relatives adjusted to the age distribution of the U. S. population by the direct method.

compiled by Division of Chronic Diseases through the courtesy of the Florida State Health Department.

earlier data see Parks, L. L., Remein, Q. R., Shields, L. S., and Turvaville, J.: Screening relatives of diabetics in da counties. Pub. Health Rep. 75: 55-59, Jan. 1960.

DIABETES IN OTHER GROUPS

Some surveys have indicated that there are higher rates of undiscovered diabe patient clinic populations. Specific data are not currently available to compare cli clinic population samples but two studies using clinic populations had rates of 9 an of previously unknown diabetes. In both studies all persons had complete diagnost which makes it impossible to compare the findings directly with prevalence rates screening programs.

Numerous retrospective studies of diabetics and "control" groups of similar a indicated associations between diabetes and excessive birthweight of infants, perin and other abnormal outcomes of pregnancy. Table 16 shows results of a study of nondiabetic women past 45 years of age, conducted in the Union of South Africa by Jackson.[1] Nine times as many babies weighing more than 10 lbs. at birth were fou diabetic group as compared to the control group. The percentage of large babies a betic fathers also was high.

Table 16

Children of (pre)diabetic fathers, prediabetic, (pre)acromegalic, and control mothers

Children		Birthweight in lbs.			
		Less than 8	8.0 - 8.9	9-10	More than 10
	Number	Percent			
of prediabetic mothers	428	22	32	15.0	31.0
of (pre)diabetic fathers*	398	18	32	9.3	10.7
of (pre)acromegalic mothers †	61	56	26	8.0	10.0
of control mothers	819	72	19	5.3	3.7

Only one mother out of 11 actually developing acromegaly had a child weighing over 9 lbs. at birth.

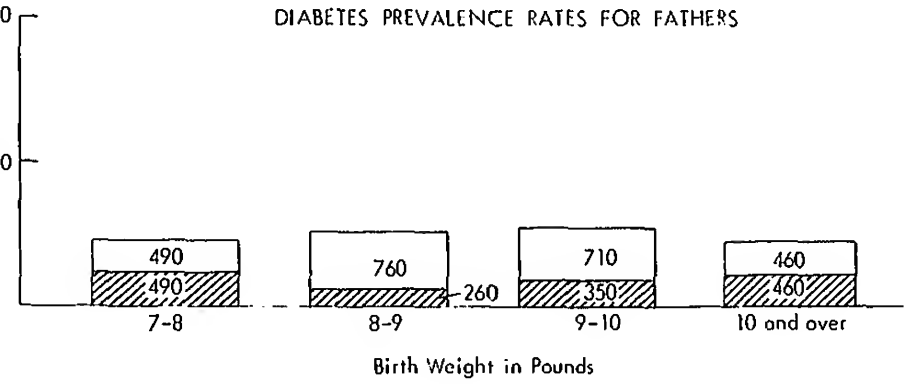
*Plainly diabetic at time of fatherhood or developed diabetes later.
†Plainly acromegalic at time of motherhood or developed acromegaly later.

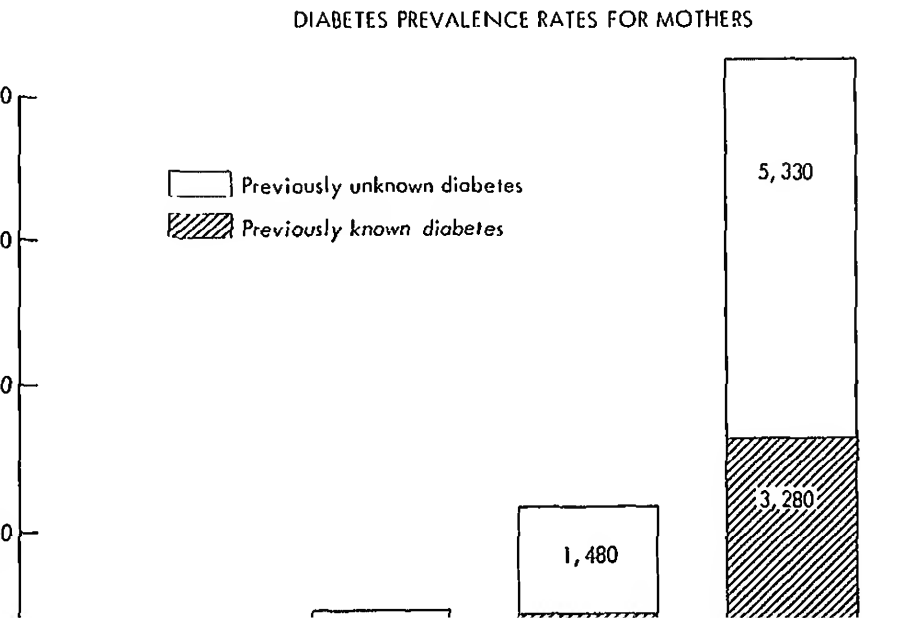
Source: Jackson, W.P.U. A concept of diabetes. Lancet 2:625-631, Sept. 24, 1955.

ospective study undertaken in Columbus, Ohio, on parents of babies weighing 7 lbs.
birth in even years 1944 through 1954, the parents were tested for diabetes from 3
after birth of the index child. The diabetes rates among parents according to birth
e index child are shown in figure 7. A significant correlation exists between dia-
mother and birthweight of the child, though no such association is discernible in t
ers. The diabetes rate in the sample of mothers of babies weighing 9 lbs. or more
more than seven times that for the mothers bearing an index baby of 7 to 9 lbs.
ses are those discovered through survey activity plus those already known as dia-
time of the survey, provided they had been diagnosed after birth of the index baby.

Figure 7

OHIO DIABETES DETECTION PROJECT, 1961
Diabetes Prevalence Rates per 100,000 Population
by Birth Weight of Child and Sex of Parent





Diabetes Casefinding Activities

In the fiscal year ending June 1959, 19 States, 2 Territories, and the Di reported diabetes screening activities to the Public Health Service. A total was reported tested in programs throughout the United States with an additio in the Territories. Over 7,000 persons or 4 percent of those tested screene summarizes these results by State. Figure 8 shows the geographic distribu activities. The figures shown refer only to persons screened in organized c The number of persons tested in private physicians' offices, hospitals, and p known.

Table 18 shows the results of diabetes casefinding programs. Only pro procedures for followup to diagnosis are included in this table. For all prog the rate of newly discovered diabetes was 7.2 per 1,000 persons tested. Thi greatly from State to State. Since method of testing, criteria for screening lation tested, and other factors differed greatly from State to State and from no epidemiologic significance can be attached to these differences in yield. ences in yield may be due to variations in the percentages of completed follo referred to physicians. In the poorest State, a diagnosis was obtained on on persons referred to physicians, while the best State approximated 100 perce up. For all projects 78.4 percent of the referrals were completed to a repo

Table 17

Diabetes testing activities reported to the Public Health Service in the United States, by State fiscal year 1959

State	Number	Rate per 1,000 population	Screened positive	
			Number	[illegible]
	14,333	11.8	511	[illegible]
	14,588	8.8	178	[illegible]
	505	0.2	13	[illegible]
Columbia	37,687	46.0	1,898	[illegible]
	615	0.1	19	[illegible]
	18,641	31.1	1,347	[illegible]
	3,267	1.2	123	[illegible]
	11,342	5.4	257	[illegible]
	4,208	1.4	136	[illegible]
	2,736	2.9	28	[illegible]
	14,275	1.8	179	[illegible]
	1,090	4.0	32	[illegible]
	17,964	1.1	670	[illegible]
olina	2,382	0.5	201	[illegible]
	12,244	1.3	574	[illegible]
	1,682	0.8	41	[illegible]
nia	5,272	0.5	218	[illegible]
	2,189	0.6	199	[illegible]
	8,746	2.3	306	[illegible]
inia	3,127	1.6	135	[illegible]
co	9,313	NA	712	[illegible]
ands	9,878	NA	147	[illegible]
s.	176,893	2.2	7,065	[illegible]
S. and Territories	196,084	NA	7,924	[illegible]

etes screening data summarized from "Report of Blood or Urine Screening Project" (PHS Form 2514) submitted to the
etes and Arthritis Branch, Division of Chronic Diseases.

lation rates based on Estimated Civilian Population, Bureau of the Census, Current Population Report Series P-25, No.
ember 27, 1959).

Figure 8

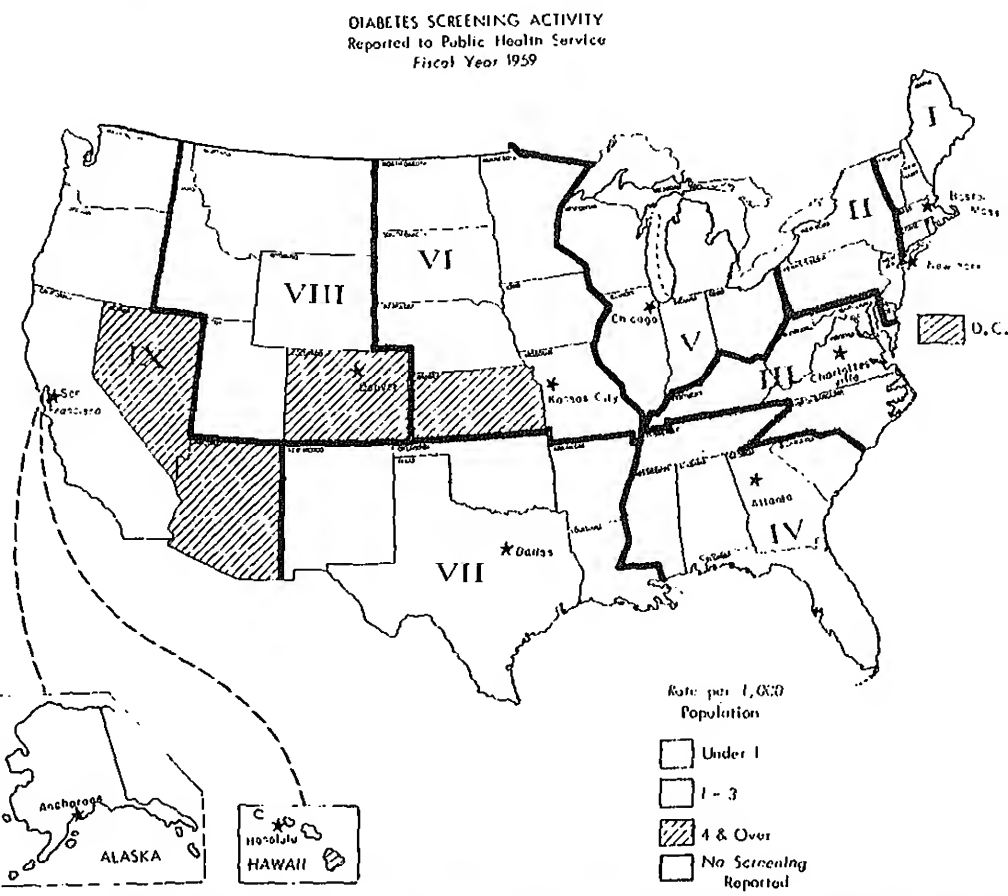

DIABETES SCREENING ACTIVITY
Reported to Public Health Service
Fiscal Year 1959
I
II
III
IV
V
VI
VII
VIII
IX
D.C.
Chicago
Kansas City
Dallas
Atlanta
Charleston, W. Va.
San Francisco
Anchorage
ALASKA
Honolulu
HAWAII
Rate per 1,000 Population
Under 1
1 - 3
4 & Over
No Screening Reported

Table 18
Newly discovered diabetics in casefinding programs reported to the Public Health Service, by State, fiscal year 1959

	Total persons tested*	New diabetics	
		Number	Rate per [illegible] tested
	14,333	69	[illegible]
	14,588	27	[illegible]
olumbia	505	2	[illegible]
	37,687	376	[illegible]
	615	4	[illegible]
	18,641	172	[illegible]
	2,267	33	[illegible]
	9,692	46	[illegible]
	4,208	13	[illegible]
	2,736	5	[illegible]
	14,275	72	[illegible]
	1,090	1	[illegible]
ia	2,143	28	[illegible]
	2,025	29	[illegible]
	12,244	71	[illegible]
	1,288	8	[illegible]
	5,272	41	[illegible]
	2,189	59	[illegible]
	8,746	49	[illegible]
	154,544	1,105	[illegible]

followup to diagnosis are included in this table.

creening data summarized from "Report of Blood or Urine Screening Project [illegible] Tab
ds Branch, Division of Chronic Diseases.

rates based on estimated civilian population, Bureau of the Census, Current [illegible]
r 27, 1959).

shows the types of population groups screened by the various [illegible] screenin
ost of those screened were in the general population served by [illegible]
ogram. Other groups included employees, persons of low [illegible] welfare
hose who already were patients at a medical facility.

Table 19
Diabetes screening activities in the United States by type of groups, fiscal year 1959

p	Number of persons screened	Perce of tot
ups	176,893	100.
lation	110,842	62.
oups	25,270	14.
diabetes	11,809	6.
and welfare	8,486	4.
ts	7,891	4.
	7,886	4.

Table 20 shows results by age for those screening projects reporting are in general agreement with prevalence figures by age already shown. age and over had yield rates five to six times as great as those in the age progressive rise of rates with age was consistently noted in the individua as was the rate decrease in persons over 75.

The table indicates that diabetes screening conducted in 1959 and rep Health Service concentrated on an age group of small yield, since almost persons screened in projects reporting by age were in the age group 20-4 was small. It is unlikely that programs not reporting by age were any m area, since their results showed an overall smaller yield than programs and 10.0 per 1,000 tested respectively).

Table 20

Diabetes casefinding results, by age
Selected diabetes screening projects, fiscal year 19
as reported to the Public Health Service

Age group	Total persons tested	New diabeti Number
All ages[1]	49,958	498
Under 20	4,086	4
20 - 44	29,380	137
45 - 64	13,103	287
65 - 74	2,081	53
75 and over	671	14

[1] Includes age not stated.

Source: Diabetes screening projects reporting data by age as summarized from "Report of Blood or Urine S 2588) submitted to the Diabetes and Arthritis Branch, Division of Chronic Diseases.

HOSPITAL UTILIZATION BY DIABETICS

Frequently, newly diagnosed diabetics are hospitalized in order to regulate bring their blood sugar into control. The hospitalization period provides an exc tunity for patient education. It is unfortunate that little information is available proportion of new cases so handled. Nor, for that matter, are many facts availa of the reason for hospitalization of diabetics and the relationship of hospitalizati disease. Table 22 shows hospital utilization rates for diabetes and various othe diseases as determined in a study of Indiana's Blue Cross Service in 1956. Bec ance restrictions this is probably not typical of the entire population, but it give pression of hospitalization for diabetes. In another study conducted in Saskatch where insurance coverage of the population is almost complete, the rate of hosp diabetics per year was 2.1 per 1,000 population compared to the 1.1 rate in Indi

[1]Goldstein, M. S. and Woolsey, T. D.. Hospital utilization in Saskatchewan with special reference to variation by s U. S. Dept. of Health, Education, and Welfare, Public Health Service, Public Health Methods. Washington, D.C., 1

Table 22

Hospital utilization and costs for specified chronic diseases
Blue Cross Hospital Service — Indiana, 1956

Disease category	Admissions per 1,000 insured pop.	Average length of stay (days)	Annual days per 1,000 pop.	Hospital bill per day	Hospital bill per Adm.
All causes	115.5	7.3	838.8	$22.91	$166
Diseases of heart	4.3	14.3	60.9	22.43	320
Cancer	2.3	15.5	36.2	25.01	387
Strokes	.7	19.3	12.5	19.67	380
DIABETES	1.1	12.3	13.3	22.03	271
Ulcers (stomach, duodenal)	2.3	9.5	21.8	25.37	240
Diseases of gallbladder	2.9	10.8	30.7	24.07	259
Tuberculosis	.3	17.4	4.4	14.79	258

Source Health Information Foundation. Progress in Health Services. Hospital use and charges by diagnostic categ May 1960.

In table 23 distribution of length of hospital stay is shown for diabetes, all chron
ses, and all diagnoses. The average stay for diabetics is about the same as for al
eases but it is considerably longer than for all diagnoses.

Table 23

Hospital admissions for diabetics

Average length of hospitalization and distribution of cases by hospital stay for diabetes, chronic disease, all diagnoses, discharges from general hospitals, Saskatchewan, 1951

Diagnostic category	Length of hospital stay (days)		Percentage distribution by length of hospital stay in days							
	Mean	Median	Total	1	2-3	4-7	8-14	15-30	31-60	61-90
Diabetes	18.4	11.0	100.0	2.5	7.2	22.0	31.8	24.6	8.9	1.3
Chronic disease	17.6	9.9	100.0	4.7	10.8	23.2	27.9	21.5	8.3	1.8
All diagnoses	11.1	6.3	100.0	7.7	17.8	29.3	27.8	12.0	3.8	.8

Source: Goldstein, M.S. and Woolsey, T.D.: Hospital utilization in Saskatchewan with special reference to variation by
U.S. Department of Health, Education, and Welfare, Public Health Service, Public Health Methods, Washington,

SUMMER CAMPS FOR DIABETIC CHILDREN

A quite different type of facility for diabetics is the summer camp for diabetic
According to Joslin[1] these camps had their beginning prior to 1927. The first suc
said to have been started by Dr. Wendt in Detroit, Michigan. Summer camps supp
pital and office management of the disease in children and provide beneficial grou
and instruction. The camp activities are not unlike those of other summer camps
the additional opportunity for the children to acquire self-reliance in the handling
diabetes and for the close supervision in diet and control of the disease. Table 24
distribution of camps by State. More detailed information is available in spring is
ADA Forecast each year.

Table 20 shows results by age for those screening projects reporting su
are in general agreement with prevalence figures by age already shown. Pe
age and over had yield rates five to six times as great as those in the age gr
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Table 20

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		Number	Ra
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20 - 44	29,380	137	
45 - 64	13,103	287	
65 - 74	2,081	53	
75 and over	671	14	

[1] Includes age not stated.

Source: Diabetes screening projects reporting data by age as summarized from "Report of Blood or Urine Screen
2588) submitted to the Diabetes and Arthritis Branch, Division of Chronic Diseases.

atter how well designed and operated, screening programs
e screenees are followed up with accepted diagnostic procedu
ts. Table 21 illustrates the experiences of some comm
ed by McLoughlin, et al. These data were obtained by query of
for their diagnostic reports. In 76 percent of all persons
positive confirmed by a modified glucose tolerance test, a
ar was used to substantiate or deny the presence of diabetes.
it is concluded that further information on the accepted method
ld be sent to the physician along with the patient referral. Pro
s of the latest knowledge on the diagnosis and treatment of diab
ts of casefinding programs for diabetes are to be fully realized.

Table 21

Laboratory procedures reported by physicians as used in diagnosing pe
referred to them as a result of a positive screening blood sugar
confirmed by a modified glucose tolerance test, Georgia, 1950-52

n's primary y procedure	Total referred		Diagnosed "new" diabetic		D
	Number	Percent	Number	Percent	Number
s	1,117	56.4	419	51.5	6
lood sugar	392	19.8	210	25.8	1
dial blood	40	2.0	19	2.3	2
olerance	352	17.8	161	19.8	1
	80	4.0	6	.7	7
Total	1,981	100.0	815	100.0	1,1

ory and physical. Three patients had basal metabolism determinations.

ted from McLoughlin, C. J., Petrie, L. M., and Hodgins, T. E.: Diagnostic significance of blood
M.A. 153: 182-184, Sept. 19, 1953.

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r 20	4,086	4	1.0
44	29,380	137	4.7
64	13,103	287	21.9
74	2,081	53	25.5
d over	671	14	20.9

es age not stated.

Diabetes screening projects reporting data by age as summarized from "Report of Blood or Urine Screening Project" (PH 2588) submitted to the Diabetes and Arthritis Branch, Division of Chronic Diseases.

Table 21

rocedures reported by physicians as used in diagnosing persons
d to them as a result of a positive screening blood sugar
ed by a modified glucose tolerance test, Georgia, 1950-52

Total referred		Diagnosed "new" diabetic		Diagnosed nondiabetic	
Number	Percent	Number	Percent	Number	Percent
1,117	56.4	419	51.5	698	60.0
392	19.8	210	25.8	182	15.6
40	2.0	19	2.3	21	1.8
352	17.8	161	19.8	191	16.4
80	4.0	6	.7	74	6.3
1,981	100.0	815	100.0	1,166	100.0

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n, C. J., Petrie, L. M., and Hodgins, T. E.. Diagnostic significance of blood sugar findings.
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ases as determined in a study of Indiana's Blue Cross Service in 1956. Because
restrictions this is probably not typical of the entire population, but it gives som
sion of hospitalization for diabetes. In another study conducted in Saskatchewan,
e insurance coverage of the population is almost complete, the rate of hospitaliz
etics per year was 2.1 per 1,000 population compared to the 1.1 rate in Indiana.

selin, M. S. and Woolsey, T. D. Hospital utilization in Saskatchewan with special reference to variation by size of ho
Dept. of Health, Education, and Welfare, *Public Health Service, Public Health Methods. Washington, D.C., June 195*

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	Mean	Median	Total	1	2-3	4-7	8-14	15-30	31-60	61-90	91
tes	18.4	11.0	100.0	2.5	7.2	22.0	31.8	24.6	8.9	1.3	
ic disease	17.6	9.9	100.0	4.7	10.8	23.2	27.9	21.5	8.3	1.8	
agnoses	11.1	6.3	100.0	7.7	17.8	29.3	27.8	12.0	3.8	.8	

Goldstein, M.S. and Woolsey, T.D. Hospital utilization in Saskatchewan with special reference to variation by siz U.S. Department of Health, Education, and Welfare, Public Health Service, Public Health Methods, Washington, D.

MER CAMPS FOR DIABETIC CHILDREN

quite different type of facility for diabetics is the summer camp for diabetic ch rding to Joslin[1] these camps had their beginning prior to 1927. The first such c o have been started by Dr. Wendt in Detroit, Michigan. Summer camps supplem nd office management of the disease in children and provide beneficial group in struction. The camp activities are not unlike those of other summer camps, ex ddition opportunity for the children to acquire self-reliance in the handling of t es and for the close supervision in diet and control of the disease. Table 24 sh bution of camps by State. More detailed information is available in spring issue Forecast each year.

Table 24

Summer camps for diabetic children, United States, by State, 1961

State	Camp	Boys	Girls
Alabama	Camp Seale Harris	X	X
California	Bearskin Meadow	X	X
	Camp Dase	X	X
	Uni-betic Camp	X	X
Colorado	Camp Chief Ouray	X	X
Illinois	Summer Camp for Diabetic Children	X	X
Indiana	Camp James Whitcomb Riley	X	X
Maryland	Camp Wonderland	X	X
Massachusetts	Clara Barton Birthplace Camp		X
	Elliott P. Joslin Camp	X	
Michigan	Camp Midicha	X	X
Minnesota	Camp Needlepoint	X	X
Missouri	Camp Hope	X	X
	Camp Lions' Den	X	X
Nebraska	Camp Floyd Rogers	X	X
New Jersey	N. J. Camp for Diabetic Children	Details not yet avail	
New York	Camp Nyda	X	X
North Dakota	Camp Sioux	X	X
Ohio	Camp Ho Mita Koda	X	X
	Camp Za-Ni-Ka	X	X
Oregon	Gales Creek Camp	X	X
Pennsylvania	Camp Firefly	X	X
	Camp O'Connell	X	X
South Dakota	Camp Hainz	X	X
Tennessee	Double G Ranch	X	X
Texas	Camp Manison	X	X
	Camp Sweeney	X	X
Washington	Camp Banting	X	
	Camp Priscilla White		X
West Virginia	Camp Kno-Koma	X	X
Wisconsin	Camp Sidney Cohen		X
	Camp Whitcomb	X	

Source: "Countdown for Summer Camps" ADA Forecast, 15: [illegible], May-June 1961.

MPENSATION COSTS FOR DIABETES

lows the Federal costs per month for compensation for diabetes among war latest available figures indicate that 15,818 veterans receive compensation for u result of diabetes. The costs have been steadily rising in recent years so lion dollars per month in compensation is provided veterans disabled by

Table 25

Diabetes among war veterans

Number of veterans receiving compensation for service-connected disabilities or pension for nonservice-connected disabilities, ptember 30, 1956, where the major disability was diabetes mellitus

	Total number	Service-connected	Nonservice-connected
	15,818	9,464	6,354
	7,130	6,781	349
	6,173	169	6,004
sitment	270	270	---
	2,245	2,244	1

Monthly value of payments

$ 713,641
$ 826,203
$1,096,851

tion from Department of Medicine and Surgery, Reports and Statistics Service, Veterans Administration.

e 26 shows the number of persons disabled from diabetes who were rehabilitat
ational rehabilitation agencies for the fiscal years 1945-1958. The trend is up
tal persons rehabilitated and in those disabled from diabetes who were rehabil
by the percentage disabled from diabetes of total rehabilitants, the rehabilitat
diabetics has been increasing at a faster rate than the total.

Table 26

Number of persons by State vocational rehabilitation agencies, disabled from diabetes * rehabilitated, fiscal years 1945 - 1958

Total number of rehabilitants	Rehabilitants disabled from dia	
	Number	Percen total rehab
41,925	197	.5
36,106	208	.6
43,880	342	.8
53,131	445	.8
58,020	527	.9
59,597	546	.9
66,193	689	1.1
63,632	733	1.2
61,308	687	1.1
55,825	690	1.2
57,981	731	1.3
65,640	899	1.4
70,940	1,031	1.5
74,317	1,104	1.5

cal year 1945 based on 20-percent sample. Data for fiscal years 1946 and 1953-1958 partially estimated.

sed Case Reports, Form R-9, Office of Vocational Rehabilitation, Division of Statistics and Studies, May 1959
78 160-59).